

What is claimed is:

1. An image capturing apparatus comprising:
2 an image capturing section for converting a
3 shape of an object into an electrical quantity in
4 accordance with a parameter value set in a parameter
5 setting section, and outputting image data representing
6 an image corresponding to the shape of the object; and
7 a capture control section for receiving the
8 image data output from said image capturing section,
9 calculating an evaluation index for evaluating image
10 quality of the image from the image data, and if the
11 evaluation index falls outside a range of a preset
12 reference value, changing the parameter value set in
13 said parameter setting section so as to make the
14 evaluation index fall within the range of the reference
15 value to output image data which is received from said
16 image capturing section and the evaluation index of
17 which falls within the range of the reference value.

2. An apparatus according to claim 1, wherein
2 when the parameter value set in said parameter setting
3 section is changed, said image capturing section outputs
4 image data obtained by performing conversion again in
5 accordance with the changed parameter value.

3. An apparatus according to claim 1, wherein

2 said image capturing section comprises:
3 a detection element for converting the shape
4 of the object into an analog signal; and
5 an A/D conversion circuit for converting the
6 analog signal output from said detection element into a
7 digital signal in accordance with the parameter value
8 set in said parameter setting section and outputting the
9 signal as the image data, and
10 the parameter value set in said parameter
11 setting section includes a conversion range and
12 conversion resolution in converting the analog signal
13 into the digital signal.

4. An apparatus according to claim 1, wherein the
2 evaluation index calculated by said capture control
3 section is a grayscale index indicating a density of the
4 image data output from said image capturing section.

5. An apparatus according to claim 1, wherein the
2 evaluation index calculated by said capture control
3 section is an index indicating a spatial frequency
4 component of the image data output from said image
5 capturing section.

6. An apparatus according to claim 1, wherein the
2 evaluation index calculated by said capture control
3 section is a combination of a grayscale index indicating

4 a density of the image data output from said image
5 capturing section and an index indicating a spatial
6 frequency component of the image output from said image
7 capturing section.

7. An apparatus according to claim 1, wherein the
2 evaluation index calculated by said capture control
3 section is a histogram index generated from a histogram
4 representing a density of the image.

8. An apparatus according to claim 1, wherein the
2 evaluation index calculated by said capture control
3 section is a ridge count index generated on the basis of
4 the number of ridges in the image.

9. An apparatus according to claim 1, wherein the
2 evaluation index calculated by said capture control
3 section is a combination of a histogram index generated
4 from a histogram representing a density of the image and
5 a ridge count index generated on the basis of the number
6 of ridges in the image.

10. An apparatus according to claim 7, wherein
2 said capture control section calculates, as the
3 histogram index, a ratio between a maximum value on a
4 side of the histogram where a density of the image is
5 high and a minimum value immediately near the maximum

6 value on a side where the density of the image is lower
7 than the density representing the maximum value.

11. An apparatus according to claim 8, wherein
2 said capture control section obtains an average ridge
3 count in the horizontal direction which is an average
4 ridge count per unit length of the image in the
5 horizontal direction and an average ridge count in the
6 vertical direction which is an average ridge count per
7 unit length of the image in the vertical direction, and
8 calculates a larger one of the average ridge count in
9 the horizontal direction and the average ridge count in
10 the vertical direction as the ridge count index.

12. An image capturing method comprising:
2 converting a shape of an object into an
3 electrical quantity in accordance with a preset
4 parameter value to generate image data representing an
5 image corresponding to the shape of the object;
6 calculating an evaluation index for evaluating
7 image quality of the image from the image data; and
8 changing the parameter value to make the
9 evaluation index fall within a range of a preset
10 reference value.

13. A method according to claim 12, wherein
2 the parameter value includes a conversion

3 range and conversion resolution in converting an analog
4 signal into a digital signal,
5 the shape of the object is converted into an
6 analog signal, and
7 the analog signal is converted into a digital
8 signal in accordance with the parameter value and output
9 as the image data.

14. A method according to claim 12, wherein the
2 evaluation index is a grayscale index indicating a
3 density of the image data.

15. A method according to claim 12, wherein the
2 evaluation index is an index indicating a spatial
3 frequency component of the image data.

16. A method according to claim 12, wherein the
2 evaluation index is a combination of a grayscale index
3 indicating a density of the image data and an index
4 indicating a spatial frequency component of the image
5 data.

17. A method according to claim 12, wherein the
2 evaluation index is a histogram index generated from a
3 histogram representing a density of the image.

18. A method according to claim 12, wherein the

2 evaluation index is a ridge count index generated on the
3 basis of the number of ridges in the image.

19. A method according to claim 12, wherein the
2 evaluation index is a combination of a histogram index
3 generated from a histogram representing a density of the
4 image and a ridge count index generated on the basis of
5 the number of ridges in the image.

20. A method according to claim 17, wherein the
2 histogram index is a ratio between a maximum value on a
3 side of the histogram where a density of the image is
4 high and a minimum value immediately near the maximum
5 value on a side where the density of the image is lower
6 than the density representing the maximum value.

21. A method according to claim 18, wherein the
2 ridge count index is a larger one of an average ridge
3 count per unit length of the image in the horizontal
4 direction and an average ridge count per unit length of
5 the image in the vertical direction.

22. A fingerprint collation apparatus comprising:
2 an image capturing section for converting a
3 fingerprint ridge/valley pattern into an electrical
4 quantity in accordance with a parameter value set in a
5 parameter setting section, and outputting image data

6 representing a fingerprint image corresponding to the
7 fingerprint ridge/valley pattern;
8 a capture control section for receiving the
9 image data output from said image capturing section,
10 calculating an evaluation index for evaluating image
11 quality of the fingerprint ridge/valley pattern image
12 from the image data, and if the evaluation index falls
13 outside a range of a preset reference value, changing
14 the parameter value set in said parameter setting
15 section so as to make the evaluation index fall within
16 the range of the reference value to output image data
17 which is received from said image capturing section and
18 the evaluation index of which falls within the range of
19 the reference value; and
20 collation means for comparing and collating
21 image data output from said capture control section with
22 registered image data prepared in advance.

23. An apparatus according to claim 22, wherein
2 when the parameter value set in said parameter setting
3 section is changed, said image capturing section outputs
4 image data obtained by performing conversion again in
5 accordance with the changed parameter value.

24. An apparatus according to claim 22, wherein
2 said image capturing section comprises:
3 a detection element for converting the

4 fingerprint ridge/valley pattern into an analog signal;
5 and
6 an A/D conversion circuit for converting the
7 analog signal output from said detection element into a
8 digital signal in accordance with the parameter value
9 set in said parameter setting section and outputting the
10 signal as the image data, and
11 the parameter value set in said parameter
12 setting section includes a conversion range and
13 conversion resolution in converting the analog signal
14 into the digital signal.

25. An apparatus according to claim 22, wherein
2 the evaluation index calculated by said capture control
3 section is a grayscale index indicating a density of the
4 image data output from said image capturing section.

26. An apparatus according to claim 22, wherein
2 the evaluation index calculated by said capture control
3 section is an index indicating a spatial frequency
4 component of the image data output from said image
5 capturing section.

27. An apparatus according to claim 22, wherein
2 the evaluation index calculated by said capture control
3 section is a combination of a grayscale index indicating
4 a density of the image data output from said image

5 capturing section and an index indicating a spatial
6 frequency component of the image output from said image
7 capturing section.

28. An apparatus according to claim 22, wherein
2 the evaluation index calculated by said capture control
3 section is a histogram index generated from a histogram
4 representing a density of the image.

29. An apparatus according to claim 22, wherein
2 the evaluation index calculated by said capture control
3 section is a ridge count index generated on the basis of
4 the number of ridges in the image.

30. An apparatus according to claim 22, wherein
2 the evaluation index calculated by said capture control
3 section is a combination of a histogram index generated
4 from a histogram representing a density of the image and
5 a ridge count index generated on the basis of the number
6 of ridges in the image.

31. An apparatus according to claim 28, wherein
2 said capture control section calculates, as the
3 histogram index, a ratio between a maximum value on a
4 side of the histogram where a density of the image is
5 high and a minimum value immediately near the maximum
6 value on a side where the density of the image is lower

7 than the density representing the maximum value.

32. 32. An apparatus according to claim 29,
2 wherein said capture control section obtains an average
3 ridge count in the horizontal direction which is an
4 average ridge count per unit length of the image in the
5 horizontal direction and an average ridge count in the
6 vertical direction which is an average ridge count per
7 unit length of the image in the vertical direction, and
8 calculates a larger one of the average ridge count in
9 the horizontal direction and the average ridge count in
10 the vertical direction as the ridge count index.

33. A fingerprint collation method comprising:
2 converting a fingerprint ridge/valley pattern
3 into an electrical quantity in accordance with a preset
4 parameter value to generate image data representing a
5 fingerprint image corresponding to the fingerprint
6 ridge/valley pattern;
7 calculating an evaluation index for evaluating
8 image quality of the image from the image data;
9 changing the parameter value to make the
10 evaluation index fall within a range of a preset
11 reference value; and
12 comparing and collating the image data whose
13 evaluation index falls within the range of the reference
14 value with registered image data prepared in advance.

34. A method according to claim 33, wherein
2 the parameter value includes a conversion
3 range and conversion resolution in converting an analog
4 signal into a digital signal,
5 the fingerprint ridge/valley pattern is
6 converted into an analog signal, and
7 the analog signal is converted into a digital
8 signal in accordance with the parameter value and output
9 as the image data.

35. A method according to claim 33, wherein the
2 evaluation index is a grayscale index indicating a
3 density of the image data.

36. A method according to claim 33, wherein the
2 evaluation index is an index indicating a spatial
3 frequency component of the image data.

37. A method according to claim 33, wherein the
2 evaluation index is a combination of a grayscale index
3 indicating a density of the image data and an index
4 indicating a spatial frequency component of the image
5 data.

38. A method according to claim 33, wherein the
2 evaluation index is a histogram index generated from a

3 histogram representing a density of the image.

39. A method according to claim 33, wherein the
2 evaluation index is a ridge count index generated on the
3 basis of the number of ridges in the image.

40. A method according to claim 33, wherein the
2 evaluation index is a combination of a histogram index
3 generated from a histogram representing a density of the
4 image and a ridge count index generated on the basis of
5 the number of ridges in the image.

41. A method according to claim 38, wherein the
2 histogram index is a ratio between a maximum value on a
3 side of the histogram where a density of the image is
4 high and a minimum value immediately near the maximum
5 value on a side where the density of the image is lower
6 than the density representing the maximum value.

42. A method according to claim 39, wherein the
2 ridge count index is a larger one of an average ridge
3 count per unit length of the image in the horizontal
4 direction and an average ridge count per unit length of
5 the image in the vertical direction.

43. An apparatus according to claim 22, wherein
2 said apparatus further comprises a finger

3 resting detection section for detecting that a finger is
4 rested on said image capturing section, and
5 when said finger resting detection section
6 detects that the finger is rested on said image
7 capturing section, said image capturing section converts
8 a fingerprint ridge/valley pattern into an electrical
9 amount in accordance with a parameter set in said
10 parameter setting section, and outputting image data
11 representing a fingerprint image corresponding to the
12 fingerprint ridge/valley pattern.